SELECTING APPAREL FOR SURGICAL PROCEDURES

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BACKGROUND

There are many factors to consider when selecting apparel for surgical procedures. One example factor is that many products may be suited for some surgical procedures and not others. In addition, some of the apparel may need to meet one or sets of guidelines, such as the guidelines promulgated by the

10 Occupational Health and Safety Administration (OSHA) and Association of periOperative Registered Nurses (AORN). The apparel may also need to meet certain hospital and/or operating room specific guidelines. If the surgical procedure is part of a clinical study, the apparel may also need to meet one or more guidelines that are specified in the particular clinical study.

15 It may also be desirable that the apparel for some surgical procedures include certain features (e.g., providing a fluid barrier). In addition, an individual may not be able to readily recall every beneficial feature that might be included in each type of apparel as the individual searches for apparel.

The apparel may also need to meet one or more special requirements of the

20 particular individual that will be wearing the apparel during a surgical procedure. As an example, the size of the apparel may be important. In addition, the individual may have allergies to certain of materials (e.g., latex) such that the individual should not wear apparel made from latex. There may also be restrictions associated with using some types of apparel such that the apparel should not be used for certain

25 surgical procedures.

One of the ways that apparel has been traditionally selected for a surgical procedure is through the use of catalogs. One drawback with catalogs is that they can become outdated. In addition, most catalogs are not organized to allow an efficient review of all of the available apparel products for a surgical procedure.

SUMMARY OF THE INVENTION

There is a need for methods and data processing systems that allow individuals to select apparel products for surgical procedures without requiring the individual to sort through large amounts of information. The method and data processing system of the present invention assist in the selection of apparel products for surgical procedures by allowing individuals to automatically organize the apparel products based on criteria established by the individual.

The present invention relates to a method of selecting apparel products for surgical procedures. The method includes executing program code in a data processing system in order to determine surgical procedures that are associated with a type of apparel; selecting one of the surgical procedures; and executing program code in the data processing system in order to determine apparel products that are associated with the selected surgical procedure.

In another form, the method includes executing program code in a data processing system in order to determine guidelines that are associated with a type of apparel; selecting one of the guidelines; and executing program code in the data processing system in order to determine apparel products that are associated with the selected guideline.

In yet another form, the method includes executing program code in the data processing system in order to determine customized items that are associated with a type of apparel; selecting one of the customized items; and executing program code in the data processing system in order to determine apparel products that are associated with the selected customized item.

In still another form, the method includes entering a surgical procedure into a data processing system; and executing program code in a data processing system in order to determine apparel products that are associated with a surgical procedure; and displaying the apparel products to a user.

The present invention also relates to a data processing system. The data processing system includes a computer readable storage medium, and program code

stored on the computer readable storage medium, wherein executing the program code includes determining surgical procedures that are associated with a type of apparel entered by a user, accepting one of the surgical procedures as selected by the user, and determining apparel products that are associated with the selected surgical

5   procedure.

In another form, the data processing system includes a computer readable storage medium, and program code stored on the computer readable storage medium, wherein executing the program code includes determining guidelines that are associated with a type of apparel entered by a user, accepting one of the

10   guidelines as selected by the user, and determining apparel products that are associated with the selected guideline.

In still another form, the data processing system includes a computer readable storage medium, and program code stored on the computer readable storage medium, wherein executing the program code includes determining customized

15   items that are associated with a type of apparel entered by a user, accepting one of the customized items as selected by the user, and determining apparel products that are associated with the selected customized item.

In yet another form, the data processing system includes a computer readable storage medium, and program code stored on the computer readable storage

20   medium, wherein executing the program code includes accepting a surgical procedure entered by a user, determining types of apparel that are associated with the surgical procedure entered by the user, accepting one type of apparel as selected by the user, and determining apparel products that are associated with the selected type of apparel.

25   The purposes and features of the present invention will be set forth in the description that follows. Additional features of the invention will be realized and attained by the product and processes particularly pointed out in the written description and claims hereof, as well as from the appended drawings.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and are intended to provide further explanation of the invention claimed. The accompanying drawings, which are incorporated in and constitute part of this specification, are included to illustrate and

5   provide a further understanding of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more fully understood, and further features will become apparent, when reference is made to the following detailed description and

10   the accompanying drawings. The drawings are merely representative and are not intended to limit the scope of the claims. Like parts depicted in the drawings are referred to by the same reference numerals.

FIG. 1 is a block diagram of a data processing system which executes an apparel product for surgical procedures selection program in accordance with the

15   present invention.

FIG. 2 illustrates the relationship between the databases that are included in the apparel products for surgical procedures selection program.

FIGS. 3-6 illustrate example constructions of the databases shown in FIG. 2.

FIG. 7 is a flow diagram illustrating an example of the execution steps that

20   may be included in the apparel products for surgical procedures selection program.

FIG. 8 is a flow diagram illustrating another example of the execution steps that may be included in the apparel products for surgical procedures selection program.

DETAILED DESCRIPTION

In the following detailed description, reference is made to the accompanying drawings, which show specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those

5 skilled in the art to practice the invention. It is to be understood that other embodiments may be utilized and structural changes made, such that the following detailed description is not to be taken in a limiting sense.

The present invention relates to a method and data processing system that allow a user to find apparel products that are used in surgical procedures. The

10 method and data processing system allow a user to effectively search for such apparel products over the internet or any another type of data processing system.

One possible operating environment of the present invention is a data processing system, such as data processing system 100 shown in FIG. 1. The data processing system 100 may be a personal computer or workstation which includes a

15 processor 102, one or more display terminals 104, and one or more input devices 106. The display terminals 104 may include a monitor having a viewing screen, a printer, and/or the like. The input devices 106 may include a mouse, a keyboard, and/or similar devices.

The processor 102 includes a central processing unit (CPU) 108 which

20 communicates with the display terminals 104 and the input devices 106 through an input/output controller 110, and which processes program code stored in a memory 112. The program code stored in the memory 112 includes, at least in part, an operating system 114, various application programs 116, and an apparel product selection program 118. The application programs 116 may include word processing

25 programs, spread sheet programs, and the like. The apparel product selection program 118 is executed by the processor 102 in order to perform the functions of the present invention.

In one example form, the apparel product selection program 118 has a database component 200, which is illustrated in FIGS. 3-6, and an apparel selection

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component 1000, 2000, which are illustrated in FIGS. 7-8. FIG. 2 shows that the database component 200 of the apparel product selection program 118 is comprised of four databases. These databases include a Surgical Procedures Database 201, a Guidelines Database 202, a Personal Database 203, and an Apparel Database 204.

5 FIG. 2 also illustrates the interrelationship between the databases 201-204. This interrelationship is established by pointers which are contained in the database component 200 and which point from one database to another database.

It should be noted that each database in the database component 200 of the apparel product selection program 118 may contain pointers to one or more of the 10 other databases in the database component 200 of the apparel product selection program 118. Whether a database 201-204 contains a pointer to another database depends on the interrelationship between each of the databases 201-204.

As examples, the Surgical Procedures Database 201 has pointers which point into the Apparel Database 204. Similarly, the Guidelines Database 202 contains 15 pointers which point into the Apparel Database 204. In addition, the Personal Database 203 contains pointers which point into the Apparel Database 204. Finally, the Apparel Database 204 has pointers which point into each of the other databases 201-203.

Examples of the databases 201-204 are illustrated in FIGS. 3-6. These 20 examples are illustrative of the type of data which should be contained in the databases 201-204 in order to facilitate operation of the present invention. It should be understood, however, that these examples are not exhaustive of the type of data which may be contained within each of the databases 201-204.

Accordingly, an example of the Surgical Procedures Database 201 is 25 illustrated in FIG. 3. This example of the Surgical Procedures Database 201 includes data for three example surgical procedures, which are designated, for purposes of this example, as X, Y, and Z. For each such surgical procedure, the Surgical Procedures Database 201 includes (i) Apparel pointers $A_1, A_2, A_3 \ldots A_{n-1}$, $A_n, A_{n+1} \ldots$ which point into the Apparel Database 204. The Apparel pointers A_1,

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A_2, A_3, . . . A_{n-1}, A_n, A_{n+1} . . . point into the Apparel Database 204 in order to designate the types of apparel which are associated with the surgical procedures listed in the Surgical Procedures Database 201.

5 The Surgical Procedures Database 201 also stores a listing of the surgical procedures SA_1, SA_2, SA_3 . . . which are associated with the apparel contained in Apparel Database 204. These surgical procedures SA_1, SA_2, SA_3 . . . are stored in the Surgical Procedures Database 201 in accordance with the surgical procedure pointers S_1, S_2, S_3 . . . S_{n-1}, S_n, S_{n+1} . . . contained in the Apparel Database 204.

10 It should be noted that any type of surgical procedure may be contained within the Surgical Procedures Database 201. In addition, the surgical procedures may be stored in the Surgical Procedures Database 201 at multiple surgical levels. As an example, leg surgery, knee surgery and arthroscopic knee surgery may all be stored in the Surgical Procedures Database 201 singularly, or in some combination. Some other example surgical procedures include cesarean section, laparoscopic 15 appendectomy, shoulder arthroscopy, hip-replacement, heart by-bypass, cardiac catheterization (or coronary angiogram), coronary artery bypass graft (CABG), ophthalmic and various excisions (among other procedures).

It should be noted that other procedures may be included in the surgical procedures database 201. Some examples include other invasion percutaneous 20 medical procedures and wound cleansing and/or debridement procedures

In some forms, the Surgical Procedures Database 201 may also store one or more features that are desirable when performing certain types of surgery. The features may be stored in addition to, or instead of, surgical procedures depending on the design of the database component 200. As examples, the Surgical Procedures 25 Database 201 may store information relating to whether certain apparel provides features such as a fluid resistance, fluid impermeability, fluid filtration (such as air), body coverage, inflammability, lint or particle minimization and mobility (among other features). In some forms, the features of certain apparel may be part of a separate database.

An example of the Apparel Database 204 is illustrated in FIG. 4. This example of the Apparel Database 204 includes data for three example types of apparel which are designated, for purposes of this example, as apparel T, U and V. For each type of apparel, the Apparel Database 204 includes (i) Surgical Procedures

5   pointers S_1, S_2, S_3, . . . S_{n-1}, S_n, S_{n+1} . . . which point into the Surgical Procedures Database 201, (ii) Guidelines pointers G_1, G_2, G_3, . . . G_{n-1}, G_n, G_{n+1} . . . which point into the Guidelines Database 202, and (iii) Personal pointers P_1, P_2, . . . P_{n-1}, P_n, P_{n+1}, . . . which point into the Personal Database 203.

The Surgical Procedures pointers S_1, S_2, S_3 . . . S_{n-1}, S_n, S_{n+1} . . . point into the

10   Surgical Procedures Database 201 in order to designate the types of surgical procedures which are associated with the apparel listed in the Apparel Database 204. Similarly, Guidelines pointers G_1, G_2, G_3 . . . G_{n-1}, G_n, G_{n+1} . . . point into the Guidelines Database 202 in order to designate the guidelines that may be required for the apparel listed in the Apparel Database 204. In addition, Personal pointers P_1,

15   P_2, . . . P_{n-1}, P_n, P_{n+1}, . . . point into the Personal Database 203 in order to designate the how the apparel listed in the Apparel Database 204 may be personalized (i.e., customized) to a user.

The Apparel Database 204 also stores a listing of the apparel AS_1, AS_2, AS_3 . . . which is associated with the surgical procedures contained in Surgical Procedures

20   Database 201. The apparel AS_1, AS_2, AS_3 . . . are stored in the Apparel Database 204 in accordance with the apparel pointers A_1, A_2, A_3, . . . A_{n-1}, A_n, A_{n+1} . . . contained in the Surgical Procedures Database 201 (FIG. 3).

The Apparel Database 204 also stores a listing of the apparel AG_1, AG_2, AG_3 . . . which is associated with the guidelines contained in Guidelines Database 202.

25   The apparel AG_1, AG_2, AG_3 . . . are stored in the Apparel Database 204 in accordance with the apparel pointers A_1, A_2, A_3, . . . A_{n-1}, A_n, A_{n+1} . . . contained in the Guidelines Database 202 (FIG. 5).

The Apparel Database 204 also stores a listing of the apparel AP_1, AP_2, AP_3 . . . which is associated with the customized items contained in Personal Database 203.

The apparel AP_1, AP_2, AP_3. . . are stored in the Apparel Database 204 in accordance with the apparel pointers A_1, A_2, A_3, . . . A_{n-1}, A_n, A_{n+1} . . . contained in the Personal Database 203 (FIG. 6).

It should be noted that any type of apparel may be contained within the

5   Apparel Database 204. In addition, the apparel may be stored in the Apparel Database 204 at multiple levels with more than one type of description. As an example, boot cover, bootie, bootee and shoe cover may all be stored in the Apparel Database 204 singularly, or in some combination. Some other examples of apparel include gowns, face masks, gloves, visors, eye shields, respirators and draping

10   systems.

An example of the Guidelines Database 202 is illustrated in FIG. 5. The Guidelines Database 202 includes data for guidelines (e.g., D, E and F) that may be required of the apparel which is used in surgical procedures. The Guidelines Database 202 also stores a listing of the guidelines GA_1, GA_2, GA_3 . . . which are

15   associated with the apparel contained in the Apparel Database 204. These guidelines GA_1, GA_2, GA_3 . . . are stored in the Guidelines Database 202 in accordance with the guidelines pointers G_1, G_2, G_3 . . . G_{n-1}, G_n, G_{n+1} . . . contained in the Apparel Database 204.

As discussed above, for each guideline, the Guidelines Database 202 includes

20   (i) Apparel pointers A_1, A_2, A_3 . . . A_{n-1}, A_n, A_{n+1} . . . which point into the Apparel Database 204. The Apparel pointers A_1, A_2, A_3, . . . A_{n-1}, A_n, A_{n+1} . . . point into the Apparel Database 204 in order to designate the types of apparel which are associated with guidelines listed in the Guidelines Database 202.

It should be noted that any type of guideline may be contained within the

25   Guidelines Database 201. In addition, the guidelines may be stored in the Guidelines Database 201 at multiple levels. As an example, broad standardized guidelines, such OSHA and AORN may be stored in the Guidelines Database 201.

In some forms, the Guidelines Database 202 may also store one or more specific guidelines, such as particular hospital guidelines, or even particular

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operating room guidelines. Some other example specific guidelines include operating room, catheterization lab, emergency room, central services, critical care and intensive care.

The product selection program 118 may also include the ability to identify a

5   user such that only relevant specific guidelines are displayed to the user. As an example, if the product selection program 118 recognizes the user as being associated with a certain hospital, only specific guidelines associated with that hospital may be displayed to the user. In addition, the product selection program 118 may recognize the user as being involved in a particular field of surgery such

10   that only guidelines for clinical studies related to that particular field may be displayed to the user.

An example of the Personal Database 203 is illustrated in FIG. 6. The Personal Database 203 stores a listing of customized items of apparel contained in the Apparel Database 204. These customized items PA_1, PA_2, PA_3 . . . are stored in

15   the Personal Database 203 in accordance with the personal pointers P_1, P_2 . . . P_{n-1}, P_n, P_{n+1} . . . contained in the Apparel Database 204.

As discussed above, for each customized item of apparel, the Personal Database 203 includes (i) Apparel pointers A_1, A_2, A_3 . . . A_{n-1}, A_n, A_{n+1} . . . which point into the Apparel Database 204. The Apparel pointers A_1, A_2, A_3, . . . A_{n-1}, A_n,

20   A_{n+1} . . . point into the Apparel Database 204 in order to designate the types of apparel which are associated with customized items listed in the Personal Database 203.

It should be noted that any type of customized item may be contained within the Personal Database 203. In addition, multiple customized items may be stored in

25   the Personal Database 203 for each apparel product. As an example, customized items for each apparel product may be organized within the Personal Database 203 by color and/or size. The apparel may be organized generally by size (e.g., S, M, L), and/or more specifically by size (e.g., 8 inch head size, 38 inch inseam). Some other examples of customized items for the apparel products include non-latex apparel

products for individuals that are allergic to latex. In addition, the apparel may include a particular type of fastening system (e.g., buttons, Velcro and/or adhesives).

In some forms, customized items for each apparel product may be organized within the Personal Database 203 according to labels on the apparel (e.g.,

5 "Methodist Hospital" or "Dr. John Doe." In addition, the customized items may be categorized by the job functions of the individuals that wear the apparel. Some examples include nurse, doctor, anesthesiologist and maintenance (among other job functions).

As shown in FIG. 7, when the product selection program 118 is entered by a

10 user who wishes to select an apparel product for a surgical procedure, block 1002 of the apparel selection component 1000 is executed to display a prompt to the user to enter either the type of apparel that is desired, or the type of surgical procedure for which the apparel will be used.

When the user enters a type of apparel in response to the screen display

15 presented by the block 1002, block 1004 is executed to display one or more of the following: (i) the surgical procedures where the apparel may be used; (ii) the guidelines that may be required for the apparel; and (iii) customized items of the apparel.

As an example, if the user enters apparel T in the screen display presented to

20 the user by execution of block 1004, block 1006 accesses the apparel T in the Apparel Database 204 in order to determine the surgical procedures pointer S_1, the guidelines pointer G_1, and the personal pointer P_1 for apparel T.

Block 1006 then fetches the surgical procedures (and/or features) SA_1 from the Surgical Procedures Database 201 based upon surgical procedures pointer S_1 for

25 apparel T in the Apparel Database 204, and stores the fetched surgical procedures SA_1 in temporary memory 1008. Block 1006 also fetches the guidelines GA_1 from the Guidelines Database 202 based upon the guidelines pointer G_1 for the apparel T in the Apparel Database 204, and stores the guidelines GA_1 in the temporary memory 1008. Block 1006 also fetches the customized items PA_1 from the Personal

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Database 203 based upon the personal pointer P_1 for the apparel T in the Apparel Database 204, and stores the fetched customized items PA_1 in the temporary memory 1008.

The apparel T entered as a result of the screen display (block 1004) may also be stored in the temporary memory 1008. Thereafter, block 1010 is executed to display the surgical procedures SA_1, the guidelines GA_1, the customized items PA_1, and the apparel T to the user. At block 1012 the user may select one of the following: (i) the displayed surgical procedures SA_1 where the apparel T will be used; (ii) the guidelines GA_1 that are required for the apparel T; and (iii) the customized items that are associated the apparel T.

When the user selects one of the surgical procedures (procedure X will be used as an example) where the apparel will be used, block 1018 accesses the surgical procedure in the Surgical Procedures Database 201 in order to determine the apparel pointers A_1. The block 1018 then fetches apparel AS_1 from the Apparel Database 204 based upon the apparel pointers A_1 in the Surgical Procedures Database 201, and stores the fetched apparel AS_1 in temporary memory 1022. Block 1024 then displays the fetched apparel AS_1 to the user. The user may select one or more of the displayed apparel in order to purchase the apparel or receive further information on the apparel.

In some forms, Block 1024 may permit the user to further filter the displayed apparel by (i) selecting a guideline and then fetching apparel AG_n from the Apparel Database 204 based upon the apparel pointers A_n in the Guidelines Database 202; and/or (ii) selecting a customized item and then fetching apparel AP_n from the Apparel Database 204 based upon the apparel pointers A_n in the Personal Database 203. It should be noted that any apparel that is fetched from the Apparel Database 204 may be displayed to the user for purchase selection or to receive further information on the apparel.

When the user selects one of the guidelines for the apparel T, the block 1038 accesses the guideline in the Guideline Database 202 in order to determine one or

more apparel pointers A_n. The block 1038 then fetches apparel AG_n from the Apparel Database 204 based upon the apparel pointers A_n in the Guideline Database 202, and stores the fetched apparel AG_n in temporary memory 1042. Block 1024 then displays the fetched apparel AG_n to the user. The user may select one or more

5   of the displayed apparel in order to purchase the apparel or receive further information on the apparel.

In some forms, Block 1024 may permit the user to further filter the displayed apparel by (i) selecting a surgical procedure and then fetching apparel AS_n from the Apparel Database 204 based upon the apparel pointers A_n in the Surgical Procedures

10   Database 201; and/or (ii) selecting a customized item of apparel and then fetching apparel AP_n from the Apparel Database 204 based upon the apparel pointers A_n in the Personal Database 203.

When the user selects a customized item for the apparel T, block 1058 accesses the customized item in the Personal Database 203 in order to determine one

15   or more apparel pointers A_n. The block 1058 then fetches apparel AP_n from the Apparel Database 204 based upon the apparel pointers A_n, and stores the fetched apparel AP_n in temporary memory 1062. Block 1024 then displays the fetched apparel AP_n to the user. The user may select one or more of the displayed apparel in order to purchase the apparel or receive further information on the apparel.

20   In some forms, Block 1024 may permit the user to further filter the displayed apparel by (i) selecting a surgical procedure and then fetching apparel AS_n from the Apparel Database 204 based upon the apparel pointers A_n in the Surgical Procedures Database 201; and/or (ii) selecting a guideline and then fetching apparel AG_n from the Apparel Database 204 based upon the apparel pointers A_n in the Guidelines

25   Database 202.

It should be noted the surgical procedures, guidelines, customized items and/or apparel may be selected by a user in any conventional manner. Some examples include typing information onto a keyboard and/or clicking onto internet links that are displayed to a user (among other examples).

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FIG. 8 shows another form of the apparel selection component 2000. When the product selection program 118 is entered by a user, block 2002 is executed to display a prompt to the user to enter either the type of apparel desired, or the type of surgical procedure for which the apparel will be used. When the user enters the type

5 of surgical procedure, block 2006 fetches the apparel that may be required for the surgical procedure.

As an example, if the user enters surgical procedure X in response to the screen display presented to the user by execution of the block 2002, the block 2006 accesses the surgical procedure X in the Surgical Procedures Database 201 in order

10 to determine the apparel pointer A_1 which represents the surgical procedure X. The block 2006 then fetches the apparel AS_1 from the Apparel Database 204 based upon the apparel pointer A_1, and stores the fetched apparel AS_1 in temporary memory 2008.

The surgical procedure X entered as a result of the screen display is also stored

15 in the temporary memory 2008. Thereafter, block 2010 displays the surgical procedure X and the fetched apparel AS_1 to the user.

In some forms, at block 2012 the user may further filter the displayed apparel by selecting (i) the guidelines that may be required for the displayed apparel; and/or (ii) customized items that relate to the displayed apparel.

20 When the user selects a guideline (e.g., D, E or F), block 2038 accesses the guideline in the Guideline Database 202 in order to determine one or more apparel pointers A_n. The block 2038 then fetches apparel AG_n from the Apparel Database 204 based upon the apparel pointers A_n in the Guidelines Database 202, and stores the fetched apparel AG_n in temporary memory 2042. Block 2024 then displays the

25 fetched apparel AG_n to the user. The user may select one or more of the displayed apparel in order to purchase the apparel or receive further information on the apparel

When the user selects a customized item, block 2018 accesses the customized item in the Personal Database 203 in order to determine one or more apparel pointers A_n. The block 2018 then fetches apparel AP_n from the Apparel Database

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204 based upon the apparel pointers A_n and stores the fetched apparel AP_n in temporary memory 2022. Block 2024 then displays the fetched apparel AP_n to the user.

Accordingly, the present invention provides a set of interacting databases 201-
5   204 which contain information on surgical procedures, guidelines, apparel and customized items associated with the apparel. The example apparel selection components 1000, 2000 that are illustrated in FIGS. 7 and 8 integrate with the databases 201-204 in order to provide a solution for selecting apparel products that are used in surgical procedures. Organizing the surgical procedures, guidelines,
10   apparel and customized items that are associated with the apparel into databases allows the method and data processing system to be easily upgraded as the surgical procedures, guidelines, apparel and customized items change over time.

Certain modifications of the present invention have been discussed above. Other modifications will occur to those practicing in the art of the present invention.
15   As an example, more or fewer databases may be used in the database component 200 of the product selection program 118.

In addition, examples of pointers which point from specific databases into other specific databases have been disclosed herein. It should be understood, however, that these pointers are illustrative, such that pointers may point from any
20   of the databases disclosed herein to any of the other databases.

It should be noted that the Surgical Procedures Database 201, the Guidelines Database 202, the Personal Database 203, and the Apparel Database 204 disclosed herein are examples. These databases may contain more or different data than that shown.

25   The operations discussed above with respect to the described methods may be performed in a different order from those described herein. In addition, FIGS. 1-8 are representational and are not necessarily drawn to scale. Certain proportions thereof may be exaggerated, while others may be minimized.

While the invention has been described in detail with respect to the specific aspects thereof, it will be appreciated that those skilled in the art, upon attaining an understanding of the foregoing, may readily conceive of alterations to, variations of, and equivalents to these aspects which fall within the spirit and scope of the present invention, which should be assessed accordingly to that of the appended claims.